

support her contention that using this highest average will be offset by not adjusting for factors that would have otherwise increased the settlement rate.

B. Ms. Biggs Employs Arbitrary Assumptions and Adjustments

82. Ms. Biggs attempts to incorporate the effect of changes in the environment into which she is projecting in order to estimate future claim levels and settlement values. However, because Ms. Biggs does not model these changes she cannot reliably account for their effect, but rather she employs arbitrary adjustments with no evidence to support their validity.

1. Ms. Biggs Makes Arbitrary and Unsound Adjustments for Tort Reform

83. Ms. Biggs acknowledges in her report that "...the asbestos litigation environment has undergone significant changes over the last several years."²⁴ To incorporate these changes into her forecasts, Ms. Biggs projects an increase in the dismissal rates for nonmalignant claims from Grace's historical level for claims. However, Ms. Biggs provides no evidence regarding the reliability of the magnitude of these decreases. Further, Ms. Biggs assumes these tort reforms will have no effect on the dismissal rate of malignant claims, an assertion for which she provides no justification.

84. Unlike Dr. Peterson, Ms. Biggs acknowledges that tort reform will likely affect future settlement values. Despite this acknowledgement, however, Ms. Biggs still applies an arbitrary assumption as to the effect. She assumes a 10% reduction in average settlement values from 2003 to 2005 due to tort reform.²⁵ Ms. Biggs provides no

²⁴ Biggs Report, p15.

²⁵ Ms. Biggs states that she imposes "a decline in the average claim values from 2003 to 2005 of 10% per year to reflect changes in the tort system" (Biggs Report, p. 61).

theoretical or empirical basis for either this 10% reduction or the limitation of this effect to the three years.

85. Finally, like Dr. Peterson, Ms. Biggs makes the assumption that tort reform will have no effect on individuals' claiming behavior. Ms. Biggs admits that certain jurisdictions have adopted "laws relating to case consolidation and forum, tightening restrictions regarding the connection between a plaintiff and the venue of the case" (Ms. Biggs, p. 15). Given that several states have recently adopted venue reform, it is likely that the incentives to file claims in these states will decrease going forward.

86. In sum, when accounting for these changes in the asbestos litigation environment, Ms. Biggs applies *ad hoc* adjustments to her estimates of Grace's future claim levels and settlement values without modeling the effect of changes in litigation environment on incentives to litigate.

2. Ms. Biggs Employs Arbitrary Assumptions Regarding the Growth of Future Settlement Values

87. Ms. Biggs assumes a growth pattern for average settlement values, from an adjusted 2001 base value, but provides no evidence to justify the validity of her assumptions. As she states in her report "I applied the historical trends for each disease type selected above (e.g. 40% for mesothelioma) through the 2002 Settled Year. I then impose a decline in the average claim values from 2003 to 2005 of 10% to reflect changes in the tort system, relating to venue restrictions and joint and several liability. I then assume a 1% increase per year for five years beginning in 2006, relating to expected increases in plaintiff demands. I assume a 3% annual increase each year to reflect inflation and I also assume there will be a 1% annual reduction in claim values beginning

in 2006 for 15 years to reflect lower expected awards as claimants age.”²⁶ Like her other adjustments, Ms Biggs never provides evidence to support why these different growth rates are valid. For example, she provides no evidence as to why plaintiffs did not already seek maximum awards in the historical data from which she is projecting or why these changes warrant a 1% increase for five years. Finally, Ms. Biggs provides no justification either for why the decline from aging claimants should equal 1% and why this aging population does not affect settlement values until 2006.

C. Ms. Biggs’ Faulty Methods Render Her Forecasts Unreliable and Uninformative.

88. Ms. Biggs uses a simple extrapolation method with arbitrary adjustments to project Grace’s future asbestos-related claim levels and settlement values. For precisely the same reasons outlined above regarding Dr. Peterson’s estimation methodology, Ms. Biggs’ extrapolation methods are insufficient and fail to meet basic econometric criteria for sound estimation. Ms. Biggs’ approach does not follow scientific or any reliable methodology for forecasting these outcomes, given both the changing legal environment and changing economic incentives affecting the choices of the participating agents. As a result, Ms. Biggs’ forecasts of Grace’s future asbestos claims and claim values are unreliable and uninformative.

²⁶ Biggs Report, p. 61.

**VI. GRACE'S FUTURE CLAIMS AND CLAIM VALUES UNDER TORT LAW
WOULD NOT BE RELIABLE ESTIMATES OF GRACE'S FUTURE CLAIMS
AND CLAIM VALUES UNDER BANKRUPTCY LAW**

89. Both Dr. Peterson and Ms. Biggs state that they are forecasting methods under the assumption that the future claims and claim values they estimate would be settled in a state tort system.²⁷ Therefore, despite the fact that neither Dr. Peterson nor Ms. Biggs reliably model the processes and factors that determine these outcomes, their estimates implicitly depend on measuring the processes and factors that generate claim levels and settlement values in a tort system. Further, the data from which both experts extrapolate were also generated in a world governed by tort law. However, I am advised that the procedures and legal standards that will be applied in the bankruptcy context are materially different from those of the tort system but for the bankruptcy.

90. For example, I have been told to assume that under the bankruptcy process, both pending and future asbestos claims will be evaluated applying stricter standards than have generally been applied in state courts. Many claims that Grace settled in the past may not satisfy these stricter standards and, therefore, would have had substantially different expected values under a bankruptcy court. The resulting reduction in expected claim values likely would result in a substantial reduction in claims. Thus, claims and claim values in a bankruptcy context could not be extrapolated from predictions under the tort world, even if those predictions were accurate and reliable.

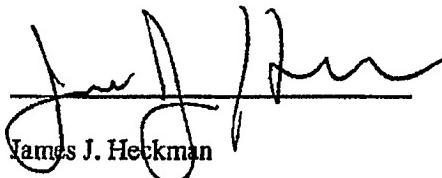
91. In general, the underlying processes and factors that would generate future claim values and claim level outcomes in a bankruptcy court are different from those that generated the observed outcomes in the past. To reliably account for these changes, an

²⁷ See Peterson Report, p. 9 and Biggs Report, p. 5.

accurate estimation method should model all these changes reflecting the new environment.

92. I have shown that Dr. Peterson and Ms. Biggs have not produced reliable projections for even what they purport to estimate – Grace's total asbestos liability but for the bankruptcy. To the extent the appropriate inquiry is instead to estimate Grace's liability under a bankruptcy regime, their estimates are even more unreliable because they fail to account for the changes in these underlying determinants when forecasting outcomes realized in a bankruptcy environment.

My work is ongoing and I reserve the right to modify this report as new information becomes available between now and the time of trial. I also anticipate that I may be asked to offer opinions about other expert reports that I have not yet received.



The image shows a handwritten signature in black ink. The signature consists of several fluid, cursive strokes that form the letters 'J', 'a', 'm', 'e', 's', ' ', 'J', ' ', 'H', 'e', 'c', 'k', 'm', 'a', 'n'. Below the signature, there is a thin horizontal line.

James J. Heckman

September 25, 2007

APPENDIX A: TABLES

Table 1
Number of Filings against Grace, by Filing Year and Disease Claim Type

Filing Year	Mesothelioma	Lung Cancer	Other Cancer	All Cancers	Non-Malignant
1996	652	1,574	550	2,776	34,454
1997	634	1,238	361	2,233	23,651
1998	574	887	292	1,753	18,302
1999	675	1,114	313	2,102	20,295
2000	1,159	1,690	463	3,312	40,079
% Change 1996-1998				-37%	-47%
% Change 1998-2000				89%	119%

Source: Peterson Report, Table 29.

Note: "All Cancers" is the sum of Mesothelioma, Lung Cancer and Other Cancer.

Table 2
Settlement Values Paid by Grace, by Year and Disease Claim Type

Year	Mesothelioma	Lung Cancer	Other Cancer	Non-Malignant
1990	28,498	24,916	5,736	4,598
1995	43,987	8,215	5,301	2,186
2000	90,952	17,682	9,767	3,328
% Change 1990-1995	54%	-67%	-8%	-52%
% Change 1995-2000	107%	115%	84%	52%

Source: Peterson Report, Table 9.

Table 3
Trends in Settlement Averages for Grace and Peterson's "Comparable" Asbestos Defendants

Year	Grace	USG	Quigley	T&N
I. Mesothelioma				
1996	27,484	21,794		33,563
1997	26,537	25,532	20,036	50,700
1998	63,774	36,072	20,927	50,812
1999	49,586	34,314	29,238	61,235
2000	90,952	59,856	46,857	86,022
2001	97,839	221,745	188,031	194,051
2002			163,311	
2003			206,643	
2004			263,118	
% Change				
1996-2001	256%	917%	838%	478%
II. Lung Cancer				
1996	9,780	5,389		12,767
1997	8,255	7,269	7,874	13,609
1998	11,892	7,303	5,684	12,646
1999	11,515	6,749	5,926	12,009
2000	17,682	10,286	8,288	14,274
2001	18,290	35,624	31,404	29,836
2002			22,804	
2003			31,237	
2004			25,006	
% Change				
1996-2001	87%	561%	299%	134%

Source: Peterson Report, Table 10.

Note: Quigley's percentage change is calculated for 1997-2001.

Table 4
Forecasts of the Number of Grace Filings, by Year and Disease Claim Type

Filing Year	Mesothelioma	Lung Cancer	Other Cancer	All Cancers	Non-Malignant	Non-Malignant to All Cancers Ratio	Total
2001 (3/4)	809	1,239	341	2,389	29,453	12	31,842
2002	1,079	1,652	454	3,185	39,271	12	42,456
2003	1,160	1,584	466	3,210	38,133	12	41,342
2004	1,237	1,532	480	3,249	37,226	11	40,474
2005	1,313	1,480	492	3,285	36,319	11	39,604
2006	1,389	1,428	501	3,318	35,412	11	38,730
2007	1,384	1,374	481	3,239	34,505	11	37,743
2008	1,352	1,309	459	3,120	33,196	11	36,316
2009	1,321	1,243	437	3,001	31,888	11	34,889
2010	1,290	1,178	414	2,882	30,579	11	33,461
2011	1,259	1,112	392	2,763	29,271	11	32,034
2012	1,228	1,047	370	2,645	27,962	11	30,607
2013	1,174	985	348	2,507	26,487	11	28,993
2014	1,121	924	325	2,370	25,011	11	27,380
2015	1,067	862	302	2,231	23,535	11	25,767
2016	1,014	800	280	2,094	22,059	11	24,153
2017	961	739	257	1,957	20,584	11	22,540
2018	906	679	237	1,822	19,143	11	20,965
2019	852	619	216	1,687	17,703	10	19,390
2020	798	559	196	1,553	16,263	10	17,816
2021	744	499	175	1,418	14,822	10	16,241
2022	690	440	155	1,285	13,382	10	14,666
2023	636	397	140	1,173	12,213	10	13,386
2024	583	354	125	1,062	11,044	10	12,107
2025	530	312	110	952	9,875	10	10,827
2026	476	269	95	840	8,707	10	9,547
2027	423	226	80	729	7,538	10	8,267
2028	382	201	71	654	6,756	10	7,410
2029	341	178	63	582	6,006	10	6,588
2030	303	156	56	515	5,311	10	5,826
2031	267	136	48	451	4,647	10	5,098
2032	234	118	42	394	4,054	10	4,447
2033	204	111	36	351	3,629	10	3,980
2034	177	86	31	294	3,019	10	3,313
2035	153	73	26	252	2,586	10	2,837
2036	130	61	21	212	2,180	10	2,393
2037	111	51	18	180	1,835	10	2,014

2038	93	41	15	149	1,522	10	1,671
2039	78	33	12	123	1,257	10	1,380

Source: Peterson Report, Table C3.

Note: "All Cancers" is the sum of Mesothelioma, Lung Cancer and Other Cancer.

APPENDIX B: LITERATURE SUMMARY

1. Dr. Peterson and Ms. Biggs both ignore the academic literature that models individual and firm choices in response to changes in laws or the legal environment. There are standard models in the law and economics literature, directly related to the outcomes Dr. Peterson and Ms. Biggs are attempting to estimate, that model an individual's decision to file a claim and published articles in which this standard model is empirically estimated. There are also many other areas in the economic literature that explore individuals' incentives and responses to changes in the legal environment. In this section, I briefly summarize some of these articles.

A. The Economic Model of Claim Filing, Settlements and Litigation

2. In Cooter and Rubinfeld (1989), the authors develop a model of litigation, drawing from earlier articles, that includes an exposition of an individual's initial decision to file a claim based on the expected costs and benefits that would result from such a claim.¹ The expected value of the legal claim is a function of the probability that the claim goes to trial and the expected award from a trial, the probability that the claim is settled and the expected settlement, the individual's costs of going to trial or settling, and the defendant's costs of going to trial. Their model implies that the benefit or value of a legal claim is increasing in the expected awards (through trial and settlement) and the probability that the case is settled (because the individual will only settle if it is

¹. The authors cite Landes (1971), Posner (1973), Schavell (1982a) and others.

better for them than going to trial) and decreasing in the individual's costs of going to trial or bargaining in a settlement.² When deciding whether or not to file a claim, an individual weighs this value against the cost of asserting the claim.

3. Other published papers have attempted to measure empirically the effects of these parameters on an individual's decision to sue. Browne and Puelz (1999) use the cost/benefit model of litigation to test the effect of explicit tort reforms on claim values and individuals' propensity to sue after an automobile accident. The authors find statistically significant effects of tort reform on various outcomes. For example, they find that caps on non-economic damages are associated with a 19% decline in average non-economic claims and 13% reduction in total claim value. By reducing the expected value of a claim, this reform would also affect an individual's propensity to file a claim in the first place. Consistent with this theory, the authors find that caps on non-economic damages reduce the average probability that an individual will file a claim by 65%. Similarly, Schmit, Browne and Lee (1997) empirically test the effect of tort reform on tort filing rates in 19 states from 1984-1990. The authors find that reform variables involving frivolous lawsuits and caps on non-economic damages are negatively related to per capita claim filings.

B. The Economic Effects to Changes in the Legal Environment

4. In addition to existing economic literature modeling the incentives to file claims and those examining the effect of tort reforms, many other papers identify

². The defendant's costs enter into the model through its effect on the expected award. Therefore, the value of the legal claim is decreasing in the defendant's costs as these costs reduce the expected trial outcome.

and/or measure the effect of other kinds of changes in the legal environment.

These include the effect of changing labor laws and the effect of tax regime changes.

1. The Effect of Labor Laws on Firm Behavior

5. Ashenfelter and Heckman (1976) and Heckman and Wolpin (1976) examine the effect of affirmative action on employment of minorities. These two papers, with the latter building on the former, examine the effect of the minority requirements, for firms awarded government contracts, set out by the Office of Federal Contract Compliance (OFCC) on the employment status of Black males and other minorities and whether any of these measured changes translated into an increase in welfare for these groups. The question these papers answer highlights the importance of understanding and building a theoretical model with which to interpret their empirical results. For example, assume a large enough number of firms exist to satisfy government needs, that these firms already (costlessly) meet the racial requirements, and that government contracts are awarded competitively. Even if one observed a higher percentage of minorities in contract-awarded firms, the OFCC may have had no effect on the hiring of minorities, as these firms met the requirements without additional hiring. On the other hand, if all firms increased their hirings of minorities in anticipation of a contract, then the measured difference could underestimate the true effect. After establishing a proper model, the authors measure a statistically significant effect on minority hiring. However, this increase in employment appears to be concentrated in the blue-collar or operations jobs in these firms.

6. Oyer and Schaeffer (2000) examine the effect of the 1991 Civil Rights Act ("CRA") on firm firing behavior. The CRA contains a number of provisions that increase the expected award from filing a wrongful termination lawsuit, including allowing an individual to now sue for punitive damages in addition to lost wages. The authors present evidence that discrimination litigation has increased since the enactment of the law. They further claim that firms face greater exposure to employment discrimination litigation when dismissing a worker for cause than when dismissing a worker as part of a mass layoff. After specifying a theoretical model, the authors present empirical evidence that firms have increased their use of mass layoffs as a substitute for individual firings.

7. Autor, Donohue and Schwab (2006) estimate the effect of common-law exceptions, adopted by U.S. State courts, to the employment-at-will doctrine that limited employers' ability to fire. These exceptions are the tort of wrongful discharge in violation of public policy, the implied covenant to terminate only in good faith and fair dealing, and the implied-in-fact contract not to terminate without good cause. All three provisions make it more difficult for a firm to fire an individual. Increasing the cost to firing an employee increases the expected costs of hiring an employee. Using data on individuals from the Current Population Survey, the authors find a significant effect of the implied contract law on state employment. They estimate that this provision reduced state employment rates by 0.8-1.7%.

8. Neumark and Wascher (2004) examine the often estimated effect of minimum wage laws across 17 OECD countries, focusing specifically on the

effect of these laws on the employment of youth. Raising the minimum wage increases an employer's costs and would create an incentive to reduce their employment. Low-skilled workers (e.g. young individuals) would be most affected. The authors find a statistically significant effect of these laws on youth employment, although the effect appears to be mitigated in countries with sub-minimum wage provisions for youth.

9. DeLeire (2000) examines firms' responses to the American with Disabilities Act ("ADA") of 1990. The employment provision of the ADA requires employers of disabled persons to provide reasonable accommodations. Additionally, employers are prohibited from discriminating against disabled persons in terms of wages and employment. These provisions raise employers' costs to hiring an individual with disabilities. Deliere presents evidence that the employment of disabled persons declined as early as 1990 and continued to decline through the beginning of 1995. He estimates that, subsequent to its enactment, the ADA indeed reduced the employment of disabled persons by 7.2% on average.

2. The Effect of Tax Laws and Tax Regimes

10. Economic theory predicts that individuals and firms respond to changes in tax laws and tax regimes. For example, much attention has been paid to estimating the effects of taxation on labor supply in the economics literature. It is well established that income taxes reduce an individual's incentive to work and

result in deadweight loss. That magnitude of this loss, however, is still being estimated today.³

11. Ziliak and Kniesner (1999) build an econometric model that estimates the intertemporal wage effects on individuals' labor supply. Using their estimates, the authors simulate that two recent tax reforms (Economic Recovery Tax Act and the Tax Reform Act of 1986 ("TRA")) stimulated male labor supply by 3 percent.

12. Auerbach and Slemrod (1997) discuss the basic tenets of the TRA and summarize the empirical economic studies that examined the effect of this tax reform on labor supply. Like Ziliak and Kniesner (1999), most studies found that the reduction in the marginal tax rate stimulated labor supply for both men and women, although this effect is mitigated by other provisions of the TRA that effectively diminished the reduction in the marginal tax rate. The authors also discuss the effect of TRA on capital gains realization behavior. For example, TRA eliminated a previous 60% exclusion of long-term capital gains subjecting 100% of these gains to full inclusion in income going forward (which, of course, was partially offset by the reduction in the marginal tax rate). However, although signed into law in October of 1986, the increase did not take effect until January 1, 1987. The authors then cite a study that determined that the long-term capital gains on corporate stock in December of 1986 were seven times their level in 1985.

13. Goolsbee (2000) investigates the impact of Internet taxation policies on commerce, since most Internet transactions do not charge a sales tax for

³ See Ziliak and Kniesner (2005) for a discussion on the history of this literature.

purchases. His results indicate that Internet sales are highly sensitive to local taxation policies as individuals who live in high sales tax locations are significantly more likely to buy over the Internet.

14. Heckman, Lochner and Taber (1998) develop a general equilibrium model to test the effects on skill formation from changes from progressive taxes to flat income and consumption taxes. Their complex model allows for, among other factors, schooling choices, investments in on-the-job training, and heterogeneity among individuals in ability, endowments, skills, and age. The authors find that progressive wage taxes reduce individuals' incentives to accumulate human capital, since the resulting earnings growth moves these individuals into higher tax brackets. Moving to a flat tax regime changes these predictions. The authors emphasize that the effects from flat taxes depend heavily on whether the model is a partial equilibrium model, one in which skill prices and interest rates are fixed, or a general equilibrium model, one in which these factors are allowed to adjust. Specifically, the incentive to invest in human capital under a flat tax regime is greatly muted when prices are allowed to change. Therefore, simply measuring the effect of a tax regime change using a partial equilibrium model can be a misleading guide when analyzing and trying to predict these effects.

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Personal

Date of Birth: April 19, 1944

Place of Birth: Chicago, Illinois

Education

B.A. 1965 (Math) Colorado College (summa cum laude)
M.A. 1968 (Econ) Princeton University
Ph.D. 1971 (Econ) Princeton University

Dissertation

"Three Essays on Household Labor Supply and the Demand for Market Goods."

Sponsors: S. Black, H. Kelejian, A. Rees

Graduate and Undergraduate Academic Honors

Phi Beta Kappa
Woodrow Wilson Fellow
NDEA Fellow
NIH Fellow
Harold Willis Dodds Fellow

Post-Graduate Honors

Honorary Degrees and Professorships

Doctor Honoris Causis, University of Montréal, May 2004.

Doctor Honoris Causis, Bard College, May 2004.

Honorary Professor, Wuhan University, Wuhan, China, 2003.

Doctor Honoris Causis, UAEM, Mexico, January 2003.

Doctor Honoris Causis, University of Chile, Fall 2002.

Honorary Doctor of Laws, Colorado College, 2001.

Honorary Professor, Huazhong University, Wuhan, China, 2001.

Honorary Member, Latin and Caribbean Economic Association, 1999.

Honorary Professor, University of Tucuman, October, 1998.

Awards

Bank of Sweden Prize in Economic Sciences in Honor of the Memory of Alfred Nobel, 2000.

Theodore W. Schultz Award, American Agricultural Economics Association Foundation, January 2007.

Ulysses Medal, University College Dublin, 2006.

Dennis J. Aigner Award for Applied Econometrics, *Journal of Econometrics*, 2005.

Jacob Mincer Award for Lifetime Achievement, Society of Labor Economics, 2005.

Medal, Center for Early Child Development for "Exceptional Contributions to Childhood Development", May 2004.

Elevated to Distinguished Service Professorship, University of Chicago, 1995–.

A. Whitney Griswold Professor of Economics, Yale University, 1988–1990.

Henry Schultz Professor of Economics, University of Chicago, 1985–.

Statistician of the Year, Chicago Chapter of the American Statistical Association, 2002.

First Annual Louis T. Benezet Distinguished Alumnus Award, Colorado College, 1985.

Irving Fisher Professor, Yale University, Fall 1984.

John Bates Clark Medal (American Economics Association), 1983.

Fellowships

Fellow, Society of Labor Economics, 2005–.

Fellow, *Journal of Econometrics*, 2005–.

Elected Member, National Academy of Sciences, 1992–.

Elected Fellow, American Academy of Arts and Sciences, 1985–.

Fellow, American Statistical Association, 2001.

Senior Research Fellow, American Bar Foundation, 1991–.

Fellow, Econometric Society, 1980.

John Simon Guggenheim Memorial Fellowship, 1978–1979.

Fellow, Center for Advanced Study in the Behavioral Sciences, Stanford University, 1978–1979.

Social Science Research Council Training Fellow, 1977–78.

Harry Scherman Fellow, National Bureau of Economic Research, 1972–1973.

Major Invited Lectures

1. "The Technology of Building Human Capacities: Lessons for Public Policy," Building Blocks Conference, Alberta, Canada, May 2007.
2. Keynote Address, "Investing in Disadvantaged Young Children Is Good Economics and Good Public Policy," National Summit on America's Children, Washington D.C., May 2007.
3. "The Economics, Technology and Neuroscience of Human Capability Formation," Allostasis/Allostatic Load Conference, Princeton University, May 2007.
4. "Left Behind: the GED and America's Dropout Problem," Brookings Institution, Hamilton Project Forum: The Role of Education in Promoting Opportunity and Economic Growth, Washington D.C., March 2007.
5. Plenary Address, "The Evolution of Labor Earnings Risk in the U.S. Economy," 4th International Finance Conference in Collaboration with Université Cergy-Pontoise, REMERG and ISC Paris, Diar el Medina, Tunisia, March 2007.
6. Theodore W. Schultz Lecture, "The New Economics of Child Quality," American Economic Association, January 2007.
7. Keynote Address, "What Lessons Should China Learn from European Welfare States?" WEAI Pacific Rim Conference, Beijing, China, January 2007.
8. Max Weber Lecture, "The Economics of Human Development," European University, Florence, Italy, October 2006.
9. Koopmans Lectures, "Cowles Commission Structural Models, Causal Effects and Treatment Effects: A Synthesis," "Instrumental Variables: Then and Now," and "The Evolution of Labor Earnings Risk in the US Economy," Cowles Foundation, Yale University, September 2006.
10. Michelson Memorial Lecture, "Skills, Schools and Synapses," US Naval Academy, September 2006.
11. Conway Institute Lecture, "The Technology and Neuroscience of Skill Formation," University College Dublin, June 2006.
12. Ulysses Medal Lecture, "The Economics of Child Development," University College Dublin, June 2006.
13. Invited Lecture, "Understanding Instrumental Variables in Models with Essential Heterogeneity," "Econometric Evaluation of Public Policies : Methods and Applications" Conference, Center for Research in Economics and Statistics, Paris, December 2005.
14. Inaugural Lecture, "Credit Constraints, Family Constraints and Optimal Policies to Reduce Inequality and Promote Productivity," Geary Institute, University College Dublin, April 2005.

15. Richard Ely Distinguished Lecturer, Johns Hopkins University, April 2005. Talks: "Inequality in America: What Role for Human Capital Policies?" "Understanding Inequality: Separating Uncertainty from Heterogeneity in Life Cycle Earnings," "Match Bias and Economic Returns to the GED," "Understanding Instrumental Variables in Models with Essential Heterogeneity," "The Importance of Cognitive and Noncognitive Skills in Explaining a Variety of Socioeconomic Outcome Measures"
16. Hicks Lecture, Oxford University, April 2004.
17. Keynote Lecture, Great Hall of the People, Beijing, December 2003 (Major Lecture on China's Investment in Human Capital at Renmin University's Anniversary Celebration).
18. Nobel Symposium Lecturer, St. Petersburg, Russia, June 2003.
19. Munich Economic Summit, Munich, May 2003.
20. European Society for Population Economics, 2003.
21. Keynote Lecture, Tinbergen Centenary, Rotterdam, April 2003.
22. W.P. Carey Lecture, Colorado College, February 2002.
23. Miguel Sidrauski Lecture, Latin American Econometric Society Meetings, Sao Paulo, 2002.
24. Tinbergen Lecture, Royal Dutch Economics Association, October 2002.
25. Walras-Pareto Lectures, University of Lausanne, October 2002.
26. Gorman Lectures, University College, London, Fall 2001.
27. Klein Lecture, University of Pennsylvania, October 2001.
28. Review of Economics and Statistics Lecture, April 2001.
29. Economic Journal Lecture, Royal Economic Society, April 2001.
30. Jovanovich Lecture, Colorado College, February 2001.
31. Distinguished Lecture, Southern Economics Association, Washington, D.C., November 2000.
32. Fisher-Schultz Lecture, World Meeting of the Econometric Society, August 2000.
33. Yoram Ben Porath Memorial Lecture, Hebrew University, (First in series), June 2000.
34. Wildavsky Forum Lecture, University of California, Berkeley, April 1999.
35. Woytinsky Lecture, University of Michigan, October 1999.
36. Invited Lecture, Latin American Meetings of the Econometric Society, Cancun, Mexico, August 1999.
37. Invited lecturer, Econometric Society Meetings, Lima, Peru, August 1998.
38. Distinguished Lecture, Institute for Survey Research, University of Michigan, January 1998.

39. McKinley Lecturer, University of Illinois, March 1998.
40. Fishelson Memorial Lecture, Tel Aviv University, December 1998.
41. Malim Harding Lecturer, University of Toronto, October 1997.
42. Jacob Marschak Lecturer, Far Eastern Econometric Society Meetings, Hong Kong, July 25, 1997.
43. Economics Study Group, Gronigen, Holland, June 1997.
44. Invited Lecture, Latin American Econometric Society Meetings, Santiago, Chile, August 1997.
45. *Journal of Applied Econometrics* Lectures (First Lecturer in a new series established by the *Journal of Applied Econometrics*, Yale University, April 17–18, 1997).
46. Keynote Lecture, Latin American Econometric Society, Santiago Chile, August 1997.
47. Keynote Lecture, Society For Economic Dynamics and Control, Mexico City, June 27, 1996.
48. Keynote Lecture, Latin American Econometric Society, Rio de Janeiro, August 1996.
49. Keynote Speaker, American Sociological Association Meetings, New York, August 16, 1996.
50. Gilbert Lecture, University of Rochester, April 1996.
51. Seymour Harris Lectures, Kennedy School of Government, 1995. (First lecturer in a newly endowed series) Lectures to be published by Harvard University Press.
52. Distinguished Quantitative Social Science Lecture, University of Indiana, April 1996.
53. Invited Lecture, Centenary of Ragnar Frisch, First Nobel Economist, Oslo, March 1995.
54. Invited Lecture, Public Policy School, SUNY Albany, October 1994.
55. Invited Lecture, Latin American Econometric Society, Caracas, August 1994.
56. Aloysius Dunaway Memorial Lecture, Michigan State University, April 1993.
57. Carl Synder Memorial Lecture, University of California at Santa Barbara, Spring 1992.
58. H. Chase-Stone Lecture in Economics, Colorado College, 1992 (participant in three day symposium).
59. Martin Luther King Lecturer, University of Michigan, 1991.
60. Invited Lecture, Econometric Study Group, Royal Economic Society, Bristol, England, 1991.
61. Barcelona Lecture, Sixth World Econometric Society, 1990.
62. Erik Malmstens Distinguished Guest Professor of Economics, Gothenburg University, Gothenburg, Sweden, 1990.
63. Invited Major Lecture, University of Western Ontario, 1989.

64. Invited Major Guest Lecture, Joint Franco-Belgian Conference in Statistics, Toulouse, France, 1988.
65. Chung-Hua Distinguished Visitor and Academica Sinica Lectures, Taiwan, 1988.
66. Fish Lecture, Brigham Young University, 1987.
67. Harry Lyman Hooker Distinguished Visiting Professor, McMaster University, 1987.
68. Leif Johansen Lecture, University of Oslo, 1986.
69. Abbott Lecturer, Colorado College, 1985.
70. Major Lecture, Australasian Econometric Society, Sydney, Australia, 1984.

Professional Experience

University College Dublin

Professor of Science and Society, 2005–

Peking University

Changjiang River Scholar Professor, 2004–

University College London

Distinguished Chair of Microeconomics, 2004–

University of Chicago

Henry Schultz Distinguished Service Professor, 1995–

Henry Schultz Professor, 1985–1995

Professor of Economics, 1977–

Associate Professor, 1973–1977 (tenured, 1974)

Irving Harris School of Public Policy, 1990–

Director, Center for Social Program Evaluation, 1991–

American Bar Foundation

Senior Fellow, 1993–

Yale University

A. Whitney Griswold Professor of Economics, 1988–1990

Professor of Statistics, 1990

Yale Law School Lecturer, 1989–1990

National Bureau of Economic Research

Associate, 1971–1985, 1987–
Research Fellow, 1972–1973

National Opinion Research Center

Research Associate, 1979

RAND Corporation

Consultant 1975–1976

Columbia University

Associate Professor 1973–1974
Assistant Professor, 1970–1973

New York University

Adjunct Assistant Professor, 1972
Council of Economic Advisors
Junior Economist Advisors, 1967

Previous Positions

Martin-Marietta Aerospace Systems Engineer, 1965

Other Professional Activities

1. Director, Economic Research Center, University of Chicago
2. Director, Center for Social Program Evaluation, University of Chicago
3. President, Western Economics Association 2003 (Cycle: VP (2003–2004), President Elect (2004–2005), President (2005–2006))
4. Council, Econometric Society, 2000–2006
5. President, Midwest Economics Association, 1998.
6. *Econometrics Reviews*, Co-Editor; Associate Editor, 1987–
7. *Handbook of Econometrics* Vol. 5, Co-Editor with Ed Leamer
8. *Handbook of Econometrics* Vol. 6A, Co-Editor with Ed Leamer
9. *Handbook of Econometrics* Vol. 6B, Co-Editor with Ed Leamer
10. Econometric Society Council, 2001–2004
11. American Economics Association, Executive Committee Member, 2000–2003

12. Science, Technology and Economic Policy Board, National Research Council, Member 2000-
13. *Evaluation Review*, Associate Editor, 1991–1996
14. *Journal of Economic Perspectives*, Associate Editor, 1989–1996
15. *Review of Economics and Statistics*, Associate Editor, 1994–2002
16. Member, Advisory Board and Dean's Search Committee, School of Public Policy, University of Chicago, 1985–1988
17. Member, National Academy of Sciences Panel on the Status of Black Americans, 1985–1988
18. *Journal of Labor Economics*, Associate Editor, 1982–
19. Member, National Academy of Sciences Panel On Statistical Assessments as Evidence in the Courts, 1982–1985
20. *Review of Economic Studies*, Associate Editor, 1982–1985
21. *Journal of Political Economy*, Co-Editor, 1981–1987
22. Member, Board of Overseers, Michigan Panel Survey of Income Dynamics, 1981–1984
23. *Journal of Econometrics*, Editor of the Special Issue on Panel Data, 1981
24. Member, Advisory Board Chicago Urban League, 1980–1987
25. Academic Press Editor of Labor Economics Series, 1980–1984
26. *Journal of Econometrics*, Associate Editor, 1977–1983
27. National Science Foundation Evaluation Panel in Economics - Member, 1977–1979
28. London School of Economics, Visitor, Spring 1977, Center for Research on the Economics of Education
29. University of Wisconsin Institute for Research on Poverty, Visiting Professor, Fall 1977
30. *Annals of Economics*, Editor of special issue on the Social Measurement Analysis of Discrete Data, 1976
31. Social Science Council Research Committee on Research Methods for Longitudinal Data, 1976–1979, 1981–1982

Students (Chair or co-chair of committee)

University of Chicago unless otherwise noted.

1. John Abowd
2. Ricardo Avelino
3. Alessandro Barbarino
4. Ricardo Barros

5. Herbert Baum
6. Andrea Beller (Columbia)
7. Christine Bellido
8. George Borjas (Columbia)
9. Stephen Cameron
10. Thomas Coleman
11. Robert Cotterman
12. Flavio Cunha
13. Eric Gould
14. Carolyn Heinrich (Harris School, University of Chicago)
15. Bo Honoré
16. Martin Ljunge
17. Lance Lochner
18. Thomas MaCurdy
19. Grecia Maruffo
20. Mauricio Mazocco
21. Salvador Navarro
22. Randall Olsen
23. Larry Olson
24. Brook Payner
25. Heleno Pioner
26. Richard Robb
27. Russell Roberts
28. Daniel Santos
29. Robert Schmitz
30. Sam Schulhofer-Wohl
31. Jeff Smith
32. Rachel Soloveichik
33. Jora Stixrud
34. Chris Taber
35. Andrea Tiseno
36. Petra Todd

37. Sergio Urzua
38. Edward Vytlacil
39. Jim Walker

Publications

Books

Longitudinal Analysis of Labor Market Data, Burton Singer (ed), Cambridge: Cambridge University Press, 1985.

Handbook of Econometrics, Vol 5 (with E. L. Leamer), New York: North-Holland, 2001.

Inequality in America: What Role for Human Capital Policy?, J. Heckman and A. Krueger, eds., Cambridge, MA: MIT Press, 2003.

Evaluating Human Capital Policies (Gorman Lectures), forthcoming Princeton University Press, 2004.

Law and Employment: Lessons From Latin America and the Caribbean (with C. Pages), University of Chicago Press, For NBER, 2004.

Handbook of Econometrics, Vol 6A (with E. L. Leamer), Under preparation. New York: North-Holland, forthcoming 2007.

Handbook of Econometrics, Vol 6B (with E. L. Leamer), Under preparation. New York: North-Holland, forthcoming 2007.

The GED, Under preparation, Brookings, 2007.

Book Reviews and Op-Ed Pieces

1. "Review of *Problems and Issues in Current Econometric Practices*," *Journal of Economic Literature*, (December, 1974).
2. "'The Cracked Bell,' Review of Herrnstein and Murray, *The Bell Curve*," *Reason*, March, 1995.
3. "Catch 'em Young: Investing in Disadvantaged Young Children is Both Fair and Efficient," *Wall Street Journal*, January 10, 2006, p. A14.

Journal Articles

1. "A Note on Second Best Conditions for Public Goods," (with R. Nelson), *Public Finance*, 1, (1972).
2. "Empirical Evidence on the Functional Form of the Earnings-Schooling Relationship," (with S. Polacheck), *Journal of the American Statistical Association*, (June 1974), 69(346), 350-354. Also, NBER, mimeo (October 1972).

3. "The Estimation of Income and Substitution Effects in a Model of Family Labor Supply," (with O. Ashenfelter), *Econometrica*, (January 1974), 42(1), 73-86. Presented at the Econometric Society Winter Meetings, (1971).
4. "Shadow Prices, Market Wages and Labor Supply," *Econometrica*, (July 1974) 42(4): 679-94.
5. "The Effect of Day Care Programs on Women's Work Effort," *Journal of Political Economy*, (March/April 1974). Reprinted in T.W. Schultz (ed.), *Economics of the Family: Marriage, Children, and Human Capital*, (University of Chicago Press, 1974), 491-518.
6. "Life Cycle Consumption and Labor Supply: An Explanation of the Relationship Between Income and Consumption over the Life Cycle," *American Economic Review*, (March 1974).
7. "A Stochastic Model of Reproduction: An Econometric Approach," (with R. Willis), *Papers and Proceedings of the American Statistical Association*, Social Statistics Section, 1974.
8. "Estimating Labor Supply Functions," (with O. Ashenfelter), in G. Cain and H. Watts (eds.), *Labor Supply and Income Maintenance*, (Chicago: Markham Publishing Company, 1974).
9. "Measuring the Effect of an Antidiscrimination Program," (with O. Ashenfelter), July 1974 mimeo, in *Evaluating The Labor Market Effects of Social Programs*, (Princeton, N.J.: Princeton University Press, 1975). Presented at the American Economic Association Winter Meetings, 1972.
10. "Estimation of a Stochastic Model of Reproduction: An Econometric Approach," (with R. Willis), in N. Terleckyj (ed.), *Household Production and Consumption*, 40, 99-145, (New York: Columbia University Press, 1976). Presented at the Conference on Research in Income and Wealth, Washington, D.C., November 1973.
11. "Simultaneous Equation Models with both Continuous and Discrete Endogenous Variables With and Without Structural Shift in the Equations," in Goldfeld and Quandt (eds.), *Studies in Nonlinear Estimation*, Ballinger, (1976).
12. "A Life Cycle Model of Earnings, Learning and Consumption," *Journal of Political Economy*, (August 1976), 84(2), pt. 2, S11-S44.
13. "Does The Contract Compliance Program Work?: An Analysis of Chicago Data," (with K. Wolpin), *Industrial and Labor Relations Review*, (Summer 1976). Presented at a Symposium on the Effect of the Office of Federal Contract Compliance on Minority Status, Cornell University, May 1975.
14. "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables," *Annals of Economic and Social Measurement*, (December 1976).
15. "Introduction," *Annals of Economic and Social Measurement*, Special issue on Discrete, Qualitative and Limited Dependent Variables, (December, 1976).

16. "New Evidence on the Dynamics of Female Labor Supply," in E. Andrews and C. Lloyd (eds.), *Women in the Labor Market*. Columbia University Press, 1978. Presented at a Labor Department Conference, "Women in the Labor Market," Columbia University, September 1977.
17. "A Partial Survey of Recent Research on the Labor Supply of Women," *AEA Papers and Proceedings*, (May 1978). Invited paper, presented to the American Economic Association, New York, 1977.
18. "An Economic Analysis of the Contract Compliance Program," *Essay in Labor Market Analysis and Economic Demography in Memory of Peter Comay*, (Halstead, 1977).
19. "The Impact of the Government on the Labor Market Status of Black Americans: A Critical Review," (with R. Butler), in L. Hausman, (ed), *Equal Rights and Industrial Relations*, Madison, Wisconsin: Industrial Relations Research Association, Ch. 9.
20. "A Beta-Logistic Model For the Analysis of Sequential Labor Force Participation by Married Women," (with R. Willis), *Journal of Political Economy*, (February 1977), 85(1), 27-58, read at the Third World Econometric Society Meetings, Toronto, 1975.
21. "Comments on 'The Labor Supply Responses of Wage Earners in the Rural Negative Income Experiment," in J. Palmer and J. Pechman (eds), *The Labor Supply Responses of Wage Earners in Welfare in Rural Areas: The North Carolina-Iowa Maintenance Experiment*, Brookings, 1977, Presented at the Brookings Conference on Evaluating the Results of the Rural Negative Income Tax Experiment, Washington, D.C., (January, 1977).
22. "Dummy Endogenous Variables in a Simultaneous Equation System," *Econometrica*, (July 1978). Original draft, April 1973. Final draft, April 1977, 46(4), 931-959.
23. "Labor Supply Estimates for Public Policy Evaluation," (with G. Borjas), *Proceedings of The Industrial and Labor Relations Research Association*, Chicago meetings, 1978.
24. "Simple Statistical Models for Discrete Panel Data Developed and Applied to Test the Hypothesis of True State Dependence Against The Hypothesis of Spurious State Dependence," *Annals de INSEE*, Paris, (1978), 227-269, (September, Special Issue).
25. "Sample Selection Bias as a Specification Error," *Econometrica*, (February 1979), 47(1), 153-161.
26. "Reply to Mincer and Ofek," (with R. Willis), *Journal of Political Economy*, (February 1979).
27. "Sample Selection Bias as a Specification Error with an Application to the Estimation of Labor Supply Functions," March, 1977 in J. Smith (ed.), *Female Labor Supply: Theory and Estimation*, (Princeton University Press, 1980).
28. "Addendum To Sample Selection Bias As A Specification Error," in E. Stromsdorfer and G. Farkas, *Evaluation Studies Review Annual*, Vol. 5, (Sage Publications, 1980), 69-74.

29. "Does Unemployment Cause Future Unemployment? Definitions, Questions and Answers from a Continuous Time Model of Heterogeneity and State Dependence," (with G. Borjas). Special Symposium issue on Unemployment, *Economica*, (May 1980).
30. "A Life Cycle Model of Female Labour Supply," (with T. MacCurdy), *Review of Economic Studies*, 1980, XLVII, 47-74.
31. "A Life Cycle Model of Family Labor Supply," in B. Weisbrod and H. Hughes (eds), *Human Resource, Employment and Development, Proceedings of Sixth World Congress*, (IEA, McMillan, 1983).
32. "Statistical Models for Discrete Panel Data," in C. Manski and D. McFadden (eds.), *Structural Analysis of Discrete Data With Econometric Applications*, (M.I.T. Press).
33. "The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time-Discrete Data Stochastic Process and Some Monte Carlo Evidence," read at the National Bureau of Economic Research Conference on Panel Data, Harvard University, (August 1978). In C. Manski and D. McFadden (eds.), *Structural Analysis of Discrete Data With Econometric Applications*, (M.I.T. Press), (originally scheduled for 1979; due to delays, published in 1981).
34. "Heterogeneity and State Dependence," in S. Rosen (ed.), *Studies in Labor Markets*, (University of Chicago Press, 1981), 91-139.
35. "Current Theoretical and Empirical Studies of Labor Supply: Second Generation Studies," (with T. MacCurdy), *Research in Labor Economics*, (JAI Press Inc., 1981).
36. "Recent Theoretical and Empirical Studies of Labor Supply: A Partial Survey," with M. Killingsworth and T. MacCurdy, presented at Oxford, 1979, in Z. Hornstein (ed), *Studies of The Labor Market*, HMS Treasury, (1981).
37. "The Impact of the Minimum Wage on the Employment and Earnings of Workers in South Carolina," (with Sedlacek), in Vol. 5, *Report of the Minimum Wage Study Commission*, U.S. Government Printing Office, 225-272, (June 1981).
38. "Models for the Analysis of Labor Force Dynamics," (with C. Flinn), *Advances in Econometrics*, 1, 35-95, (New York: JAI Press, 1982).
39. "The Identification Problem in Econometric Models for Duration Data," in W. Hildenbrand (ed), *Advances in Econometrics, Proceedings of Fourth World Congress of Econometric Society*, (Cambridge University Press, 1982).
40. "Earnings and The Distribution of Income," (with R. Michael), in *Part II, Behavioral and Social Science Research, A National Resource*, (National Academy of Science Press, 1982).
41. "New Methods For Analyzing Individual Event Histories," (with C. Flinn), *Sociological Methodology*, 99-140, (Josey-Bass, 1982).
42. "New Methods for Analyzing Structural Models of Labor Force Dynamics," (with C. Flinn), *Journal of Econometrics*, 18 (1982): 115-68.

43. "Are Unemployment and out of the Labor Force Behaviorally Distinct Labor Force States?," (with C. Flinn), *Journal of Labor Economics*, 28-42, (January, 1983).
44. "The Likelihood Function For The Multistate-Multiepisode Model in 'Models For The Analysis of Labor Force Dynamics'," (with C. Flinn), in R. Bassman and G. Rhodes, (eds), *Advances in Econometrics*, 2, 225-231, (1983).
45. "Natural Monopoly," (with D. Evans), in D. Evans (ed.), *Breaking Up Bell: Essays on Industrial Organization and Regulation*, 127-156, (North Holland, 1983).
46. "Multiproduct Cost Function Estimates and Natural Monopoly Tests for the Bell System," (with D. Evans), in D. Evans, (ed.), *Breaking Up Bell: Essays on Industrial Organization and Regulation*, Chapter 10, 253-282, (North Holland, 1983).
47. "A Method for Minimizing the Impact of Distributional Assumption in Econometric Models for Duration Data," (with B. Singer), *Econometrica*, (1984), 271-320.
48. "The Identifiability of the Proportional Hazard Model," (with B. Singer), *Review of Economic Studies*, 231-241, (April, 1984).
49. "Population Heterogeneity in Demographic Models," (with B. Singer), in A. Rodgers and K. Land (eds.), *Multidimensional Mathematical Demography*, (1984), 271-320.
50. "Comments on the Ashenfelter and Kydland Papers," *Carnegie Rochester Conference Series on Public Policy*, (1984), 209-224.
51. "Econometric Duration Analysis," (with B. Singer), *Journal of Econometrics*, (January, 1984), 63-132.
52. "The χ^2 Goodness of Fit Statistic For Models with Parameters Estimated From Microdata," *Econometrica*, (November, 1984), 52(6), 1543-1547.
53. "A Test for Subadditivity of the Cost Function With An Application to the U.S. Bell System," (with D. Evans), *American Economic Review*, (September, 1984), 615-623.
54. "Introduction," (with B. Singer), *Longitudinal Analysis of Labor Market Data*, (Cambridge: Cambridge University Press, 1985).
55. "Social Science Duration Analysis," (with B. Singer), *Longitudinal Analysis of Labor Market Data*, (University Press, 1985).
56. "A Simultaneous Equations Linear Probability Model," (with T. MaCurdy), *Canadian Journal of Economics*, (January, 1985), XVIII(1), 28-37.
57. "Alternative Methods for Estimating The Impact of Interventions," (with R. Robb), presented at Social Science Research Council Conference, Mt. Kisco, N.Y., October, 1978. In J. Heckman and B. Singer (eds.), *Longitudinal Analysis of Labor Market Data*, (Cambridge University Press, 1985).
58. "New Evidence on the Timing and Spacing of Births," (with J. Hotz and J. Walker), *American Economic Review*, (May, 1985), 179-184.
59. "Using Longitudinal Data to Estimate Age, Period and Cohort Effects in Earnings Equations," (with R. Robb), in William M. Mason and Stephen E. Fienberg, (ed),

- Cohort Analysis in Social Research Beyond the Identification Problem*, (Springer-Verlag New York Inc., 1985).
60. "Heterogeneity, Aggregation and Market Wage Functions: An Empirical Model of Self-Selection in the Labor Market," (with G. Sedlacek), *Journal of Political Economy*, (December, 1985), 93(6), 1077-1125.
 61. "The Influence of Early Fertility and Subsequent Births And The Importance of Controlling For Unobserved Heterogeneity," (with J. Hotz and Jim Walker), *Bulletin of The International Statistical Institute*, (1985), 51(2).
 62. "A Dynamic Model of Aggregate Output Supply, Factor Demand and Entry and Exit For A Competitive Industry with Heterogeneous Plants," (with V. K. Chetty), *Journal of Econometrics*, (1986), 33, No.1/2, 237-262.
 63. "Labor Econometrics," (with T. MaCurdy), in Z. Griliches and M.D. Intriligator (ed), *Handbook of Econometrics*, Vol. 3, Chapter 3, (Elsevier Science Publishers), (1986), 1918-1977.
 64. "Econometric Analysis of Longitudinal Data," (with B. Singer), in Z. Griliches and M.D. Intriligator (ed), *Handbook of Econometrics*, Vol. 3, Chapter 29, (Elsevier Science Publishers), (1986), 1690-1763.
 65. "Alternative Methods For Solving The Problem of Selection Bias in Evaluating The Impact of Treatments on Outcomes," (with R. Robb) in Howard Wainer, (ed), *Drawing Inference From Self Selected Samples*, (Springer-Verlag), (1986), 63-107.
 66. "The Earnings of Panamanian Males," (with J. Hotz), *Journal of Human Resources*, September, 1986.
 67. "Alternative Identifying Assumptions in Econometric Models of Selection Bias," (with R. Robb), in G. Rhodes, (ed), *Advances in Econometrics*, Vol. 5, 243-287, (JAI Press, 1986).
 68. "The Importance of Bundling in a Gorman-Lancaster Model of Earnings," *Review of Economic Studies*, (1987) (with J. Scheinkman), LIV, 243-255.
 69. "Female Labor Supply: A Survey," (with M. Killingsworth), Chapter 2, in O. Ashenfelter and R. Layard, *Handbook of Labor Economics*, (ed.), (North Holland, 1987).
 70. "Using Goodness of Fit and Other Criteria to Choose Among Competing Duration Models: A Case Study of Hutterite Data," (with J. Walker), *Sociological Methodology*, (1987), Chapter 9, 248-307.
 71. "Selection Bias and The Economics of Self Selection," *The New Palgrave: A Dictionary of Economics*, (MacMillan Press, Stockton, New York), 287-296.
 72. "Do We Need Experimental Data To Evaluate The Impact of Training on Earnings," (with J. Hotz and M. Dabos), *Evaluation Review*, (August 1987), 28(4), 397-427.
 73. "Are Classical Experiments Necessary For Evaluating The Impact of Manpower Training Programs?: A Critical Assessment," (with J. Hotz and M. Dabos), *Industrial Relations Research Association: Proceedings Of The Annual Meeting*, (1987), 40, 291-302.

74. "Empirical Tests of Labor Market Equilibrium: A Microeconomic Perspective," *Carnegie-Rochester Conference Series on Public Policy*, (with T. MaCurdy), 28, (Spring 1988), 231-258.
75. "Time Constraints and Household Demand Functions," in T. P. Schultz, (ed.), *Research in Population Economics*, (1988).
76. "Natural Monopoly and The Bell System: A Response to Charnes, Cooper and Sueyoshi," (with D. Evans), *Management Science*, (January, 1988), 27-38.
77. "The Value of Longitudinal Data For Evaluating The Impact of Treatments on Outcomes," (with R. Robb) in G. Duncan and G. Kalton, (eds.), *Panel Surveys*, (Wiley: New York, 1988), 512-538.
78. "The Impact of the Economy and the State on the Economic Status of Blacks: A Study of South Carolina," (with R. Butler and B. Payner) in D. Galenson, (ed.), *Markets and Institutions*, (Cambridge: Cambridge University Press, 1989), 321-343.
79. "How Voluntary is Black Unemployment and Black Labor Force Withdrawal?" in W. Darity and S. Schulman, (eds), *The Question of Discrimination: Racial Inequality in the U.S. Labor Market*, (Connecticut: Wesleyan University Press, 1989), 50-80.
80. "Determining The Impact of Federal Anti-discrimination Policy on The Economic Status of Blacks: A Study of South Carolina," (with B. Payner), *American Economic Review*, (March 1989), 79(1), 138-177.
81. "Affirmative Action and Black Employment," *Proceedings Of The Industrial Relations Research Association*, (1989), 41, 320-329.
82. "The Identifiability Of The Competing Risks Model," (with Bo Honoré), *Biometrika*, (June 1989), 76(2), 325-30.
83. "Choosing Among Alternative Non-experimental Methods For Estimating The Impact of Social Programs: The Case of Manpower Training," (with V. J. Hotz). Symposium paper with invited discussion, featured invited paper, American Statistical Association meeting, *Journal of the American Statistical Association*, (December 1989), 84(408), 862-874.
84. "Forecasting Aggregate Period Specific Birth Rates: Time Series Properties of a Microdynamic Neoclassical Model of Fertility," (with J. Walker), *Journal of The American Statistical Association*, (December, 1989), 84(408), 958-965.
85. "The Empirical Content of the Roy Model," with Bo Honore, *Econometrica*, (September, 1990), 58(5), 1121-1149.
86. "Self Selection and The Distribution of Hourly Wage Rates," with (G. Sedlacek), *Journal of Labor Economics*, (January 1990), 8(1), Part 2, S329-S363.
87. "Causal Inference and Nonrandom Samples," *Symposium on Selection Bias Models, Journal of Educational Statistics*, 14(2), (Summer 1989), 159-168, reprinted in J. Schaeffer, (ed.), *The Role of Models in Non-experimental Social Science: Two Debates*, 1991.

88. "The Third Birth in Sweden," (with J. Walker), *Journal of Population Economics*, (1990), 3(4), 235-275.
89. "A Method of Moments Estimator for The Mixing Distribution of a Mixture of Exponentials Model and A Mixture of Geometrics Model," presented at IC2 Conference, Durham, N.C., (May 1988), in W. Barnett, J. Powell and G. Tauchen, (eds.), *Nonparametric Estimation of Econometric Models*, (Cambridge: Cambridge University, 1990).
90. "Estimating Fecundability from Data on Waiting Times to First Conceptions," (with J. Walker), *The Journal of the American Statistical Association*, (June, 1990), 85(410), 283-294.
91. "The Relationship Between Wages and Income and the Timing and Spacing of Births: Evidence from Swedish Longitudinal Data," (with J. Walker), *Econometrica*, (November, 1990), 58(6), 235-275.
92. "A Nonparametric Method of Moments Estimator for the Mixture of Geometrics Model," in J. Hartog, et. al., *Panel Data and Labor Market Studies*, (North Holland, 1990).
93. "Economic Models of Fertility Dynamics: A Study of Swedish Fertility," (with J. Walker), in T. P. Schultz, (ed.), *Research in Population Economics*, (Greenwich, CT: JAI Press, 1990), Vol. 7, 3-91.
94. "Testing The Mixture of Exponentials Hypothesis and Estimating The Mixing Distribution by the Method of Moments," (with R. Robb and J. Walker), *Journal of The American Statistical Association*, (June 1990), 85(410), 582-589.
95. "The Impact of The Great Society on Social Science," *Journal of Human Resources*, (Spring, 1990), 25(2), 297-304.
96. "Understanding The Economic Progress of Black Americans," in *Business in the Contemporary World*, (Summer 1990), 19-22.
97. "The Central Role of the South in Accounting For The Economic Progress of Black Americans," *Papers and Proceedings Of The American Economic Association*, (May 1990), 80(2), 242-246.
98. "Varieties of Selection Bias," *American Economic Review*, (May 1990), 80(2), 313-318.
99. "Racial Disparity and Employment Discrimination Law: An Economic Perspective" and "Rejoinder," (with R. Verkerke), *Yale Law and Policy Review*, (Summer 1990), 8(2), 276-298.
100. "Accounting for the Economic Progress of Black Americans," in R. Cornwall and P.V. Wunnavat, (eds.), *New Approaches to Economics and Social Analyses of Discrimination*, New York: Praeger, (1991), 331-337.
101. "Continuous vs. Episodic Change: The Impact of Affirmative Action and Civil Rights Policy on the Economic Status of Blacks," (with J. Donohue), *Journal of Economic Literature*, (December 1991), 29(4), 1603-1643.

102. "Reevaluating Federal Civil Rights Policy," (with J. Donohue), *Georgetown Law Journal*, (1991).
103. "Identifying the Hand Of The Past: Distinguishing State Dependence from Heterogeneity," *American Economic Review*, (May, 1991), 81(2), 75-79.
104. "A Nonparametric Method of Moments Estimator for the Mixtures of Exponentials Model and the Mixture of Geometrics Model," in W. Barnett, J. Powell and G. Tauchen, (eds.), *Nonparametric and Semiparametric Methods in Econometrics and Statistics*, (Cambridge University Press, 1991)
105. "Randomization and Social Policy Evaluation," paper presented at Institute For Research on Poverty conference at Arlie House in Charles Manski and Irwin Garfinkel, (eds.), *Evaluating Welfare and Training Programs*, (Harvard University Press, 1992), 201-230.
106. "Understanding Third Births in Sweden," in J. Trussell, R. Hankinson and J. Tilton, (eds.), *Demographic Applications of Event History Analysis*, (Oxford University Press, 1992).
107. "Haavelmo and the Birth of Modern Econometrics: A Review of The History of Econometric Ideas by Mary Morgan," *Journal of Economic Literature*, (June 1992), Vol. 30.
108. "Evaluating an Argument For Affirmative Action," (with T. Philipson), *Rationality and Society*, (July 1992).
109. "The Urban Institute Audit Studies: Their Methods and Findings," (with P. Siegelman), in M. Fix and R. Struyk, (eds.), *Clear and Convincing Evidence: Measurement of Discrimination in America*, Chapter 5, 187-258, (Urban Institute, Fall 1993).
110. "The Nonequivalence of High School Equivalents," (with S. Cameron), *Journal of Labor Economics*, (January 1993), 11(1), 1-47.
111. "Determinants of Young Male Schooling and Training Choices," in Lisa Lynch, (ed), *Private Sector Skill Formation: International Comparisons*, (Chicago: University of Chicago Press, 1993). 201-231.
112. "What Has Been Learned About Labor Supply In The Past Twenty Years?," *AEA Papers and Proceedings*, (May 1993), 83(2), 116-121.
113. "Assessing The Case For Randomized Evaluation of Social Programs," in K. Jensen and P. Madsen, (eds), *Measuring Labor Market Program: Evaluating The Effects of Active Labor Market Initiatives*, Ministry of Labor, (Copenhagen, DK., May 1993).
114. "Is Job Training Oversold?," *The Public Interest*, (Spring 1994), Number 115, 91-115.
115. "Econometric Mixture Models and More General Models for Unobservables," (with C. Taber), *Statistical Methods in Medical Research: Frailty Models in Survival Analysis*, (1994), 3(3), 279-299.
116. "U. S. Education and Training Policy: A Reevaluation of The Underlying Assumptions Behind The New Consensus," (with J. Smith and R. Roselius), in A. Levenson and L. C. Solmon, (eds), *Labor Markets, Employment Policy and Job Creation*, (Santa Monica, CA: Milken Institute for Job and Capital Formation), (October 1994), 83-121.

- 117. "Assessing The Case For Randomized Social Experiments," (with J. Smith), *Journal of Economic Perspectives*, (Spring 1995), 9(2), 85-110.
- 118. "The Economics of Eligibility Rules for a Social Program: A Study of the Job Training Partnership Act – A Summary Report," (with T. Devine), *Canadian Journal of Economics*, (1995).
- 119. "Lessons From The Bell Curve," *Journal of Political Economy*, (October 1995), 103(5), 1091-1120.
- 120. "Coleman's Contribution to Education: Theory and Research Styles and Empirical Research," (with D. Neal), in Jon Clark, (ed), *The Contributions of James Coleman: Falmer Sociology Series*, (Falmer Press: London/N.Y., Philadelphia), (1996), 81-102.
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8. "Alternative Approaches To The Evaluation of Social Programs: Econometric and Experimental Methods," Barcelona Lecture, Sixth World Meetings of The Econometric Society, 1990.
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21. "The Evolution of Labor Earnings Risk in the US Economy," (with F. Cunha), unpublished, 2006.
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EXHIBIT B: LIST OF MATERIALS CONSIDERED

June 2007 Expert Report of Dr. Mark Peterson and backup.

June 2007 Expert Report of Ms. Jennifer Biggs and backup.

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Exhibit 2



The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2000



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Press Release

October 11, 2000

The Royal Swedish Academy of Sciences has decided that the **Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel, 2000**, will be shared between

James J. Heckman
University of Chicago, USA, and

Daniel L. McFadden
University of California, Berkeley, USA.

In the field of microeconomics, each of the laureates has developed theory and methods that are widely used in the statistical analysis of individual and household behavior, within economics as well as other social sciences.

Citation of the Academy:
"to James Heckman for his development of theory and methods for analyzing selective samples and to Daniel McFadden for his development of theory and methods for analyzing discrete choice."

Microeconomics - on the boundary between economics and statistics - is a methodology for studying micro data, i.e., economic information about large groups of individuals, households, or firms. Greater availability of micro data and increasingly powerful computers have enabled empirical studies of many new issues. For example, what determines whether an individual decides to work and, if so, how many hours? How do economic incentives affect choices of education, occupation, and place of residence? What are the effects of different educational programs on income and employment? James Heckman and Daniel McFadden have resolved fundamental problems that arise in the statistical analysis of micro data. The methods they have developed have solid foundations in economic theory, but have evolved in close interplay with applied research on important social problems. They are now standard tools, not only among economists but also among other social scientists.

Available micro data often entail **selective samples**. Data on wages, for instance, cannot be sampled randomly if only individuals with certain characteristics - unobservable to the researcher - choose to work or engage in education. If such selection is not taken into

account, statistical estimation of economic relationships yields biased results. Heckman has developed statistical methods of handling selective samples in an appropriate way. He has also proposed tools for solving closely related problems with individual differences unobserved by the researcher; such problems are common, e.g. when evaluating social programs or estimating how the duration of unemployment affects chances of getting a job. Heckman is also a leader of applied research in these areas.

Micro data often reflect **discrete choice**. For instance, data regarding individuals' occupation or place of residence reflect choices they have made among a limited number of alternatives. Prior to McFadden's contributions, empirical studies of such choices lacked a foundation in economic theory. Evolving from a new theory of discrete choice, the statistical methods developed by McFadden have transformed empirical research. His methods are readily applicable. For example, they prevail in models of transports and are used to evaluate changes in communication systems. Examples of McFadden's extensive applications of his own methods include the design of the San Francisco BART system, as well as investments in phone service and housing for the elderly.

James J. Heckman (US citizen), 56, was born in Chicago, IL in 1944. Since 1995 he is the Henry Schultz Distinguished Service Professor of Economics at the University of Chicago.

Daniel L. McFadden (US citizen), 63, was born in Raleigh, NC in 1937. Since 1990 he holds the E. Morris Cox Chair in Economics at the University of California, Berkeley.

The Prize amount, SEK 9 million, will be shared equally between the Laureates.

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